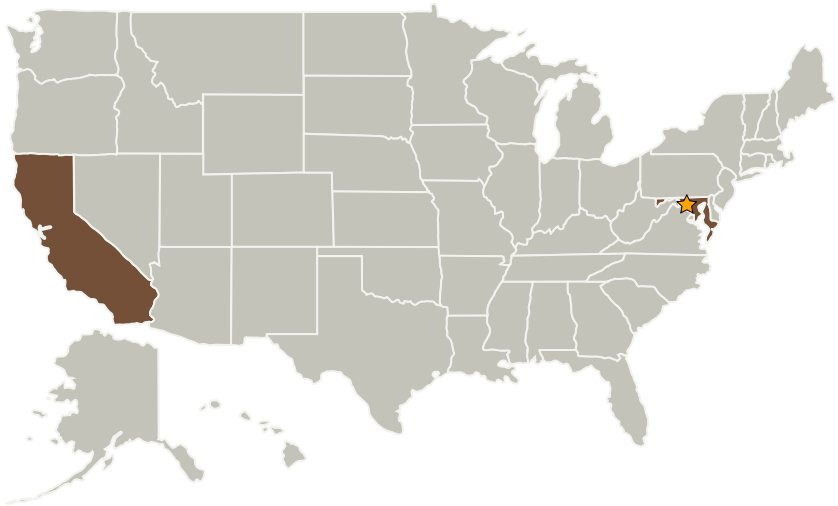
Radiation-Tolerant, Space Wire-Compatible Switching Fabric, Phase I

Completed Technology Project (2006 - 2006)

Project Introduction

Current and future programs of near-Earth and deep space exploration require the development of robust serial data transfer electronics within the spacecraft's subsystems while preserving open system architecture. The electronics must be reconfigurable, fault-tolerant, and have the ability to operate effectively for long periods of time in harsh environmental conditions. Existing data transfer systems based on passive backplanes are slow, power hungry, slightly reconfigurable, provide limited expandability, and have low tolerance to radiation effects. One of the most promising approaches to alleviate these system shortcomings is based on switching fabric (SF) backplane architecture with serial (i.e. Space Wire (SW)) interfaces. In response to the described needs, we propose to develop a novel, radiation-tolerant, SF with a user-selectable standard SW interface or our patent-pending multi-level (ML) interface that features a high frequency range, low power consumption, and advanced functionality. Our ML interconnect technique eliminates the need for the second information channel utilized in the SW data-strobe encoding scheme. Instead the channel can be used as a redundant link for improving the system's fault tolerance specification. Radiation tolerance of the proposed system is achieved through the combination of the state-of-the-art and proprietary hardening-by-technology, hardening-by-design, and hardening-by-architecture techniques.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Advanced Science and Novel Technology	Supporting Organization	Industry	Rancho Palos Verdes, California

Primary U.S. Work Locations	
California	Maryland

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX02 Flight Computing and Avionics
  - TX02.2 Avionics Systems and Subsystems
    - TX02.2.5 High Speed Onboard Interconnects and Networks